

~~CONFIDENTIAL~~ORDNANCE COMMENTS ON REPORT TO THE ADVISORY
COMMITTEE ON FOREIGN LANGUAGE PUBLICATIONS

1. Reference Sec. I, par. 47, Tab A. Chemical industry publications may be an important source of information on military solid propellant development in the Soviet Bloc. As solid propellants play an important role in determining both the optimum performance and the limitations of most weapon systems, knowledge of current developments in this field is of utmost importance. It is unlikely that information on solid propellant formulation, combustion, processing and production, as such, will be found in Soviet Bloc open literature. It is possible and likely, however, that various investigations, basic and otherwise, in the scientific and engineering fields are being published which, when properly collated and correlated, will reveal the U.S.S.R. position. Following is a tabulation of scientific and engineering areas where material pertinent to Soviet Bloc solid propellants may be found:

a. Ammonium nitrate chemistry. Particular attention should be given to hygroscopicity, control of phase change, and particle size.

b. Perchlorates chemistry. Any marked interest in particle size control, grinding methods, hygroscopicity, methods of production without using platinum, etc. would be significant. Perchlorates refer to chemical compounds having the radical ClO_4 and serve as the source of oxygen in many composite-type solid propellant formulations.

c. Research on other oxidizers such as complex salts, coordination compounds of the type of hexamine nickel II perchlorate, triethylenediamine cobalt III perchlorate, etc.

d. Cellulose and nitrocellulose, structure and chemistry, covering 12.2% N and above. Emphasis could be expected on the mechanism of decomposition, such as for new stabilizers of the type of N-methyl 4 nitro aniline and homologs. Potential explosive and non-explosive plasticizers would also be of interest. Plasticizers are chemicals, usually viscous liquids, capable of forming and maintaining the propellant into a plastic or colloidal condition.

e. Polymer chemistry, covering compounds used as binders for composite propellants or as monopropellants. This would include nitramines, nitro and nitrate compounds and development of reaction processes for the synthesis of such compounds. Here considerable judgment will be necessary as this also involves the field of high explosive chemistry in addition to rubber and commercial plastics. Other compounds which are applicable to solid propellant research are: (1) Polysulfide, (2) Epoxide resins, (3) Polyvinyl chloride, (4) Polyvinyl acetate, (5) Polybutadiene, (6) Acrylate polyesters, (7) Cellulose acetate, (8) Polyisobutylene, (9) Asphalt, (10) Polyurethanes, (11) Polypetrinacrylate, and (12) Dinitropropylacrylate.

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f. Experimental research in light metals such as beryllium, boron, lithium, and the hydrides thereof would be indicative of a search for high energy fuel constituents.

g. Any evidence that nitroguanidine is being used. For example, large scale manufacture of raw materials or intermediates such as cyanamid, dicyandiamide, guanidine salts, etc. Development of new methods of synthesis, studies of nitro-guanidine surface area, bulk density, and other physical characteristics. Activity to synthesize or investigate the properties as propellant ingredients of high nitrogen (35% or more) compounds other than nitroguanidine.

h. Research and experimental investigation on the mechanical and rheological (deformation and flow) properties of the nitrocellulose - nitroglycerin or nitrocellulose-nitroglycerin-nitroguanidine system and the composite propellant systems.

i. Methods devised for the analysis of organic lead compounds, plasticizers (both explosive and non-explosive), catalysts, perchlorates, nitrates, carbon black, organic binders (plastics, polymers, or resins) and other compounds of potential use in propellants. Analytical chemistry journals should be a fertile source for this type of information.

The foregoing comments also apply to Sec. IV, par. 7, Sec. VII, par. 5 and Sec. IX, par. 5 of the Advisory Committee Report.

2. Reference Sec. XIII, par. D 8. It is possible that routine research not specifically identified with proximity fuzes might reveal the direction and extent of Soviet research in this area. Vigilance should be exercised for articles dealing with apparently unrelated subjects which may provide this information, as follows:

- a. Photo-electric and optical properties of crystals of the silver halides.
- b. Distribution of the brightness of the infrared radiation of the night sky along the celestial dome.
- c. Diffraction of spherical electromagnetic waves at a thin conical surface of limited dimensions.
- d. Process of destruction of plastic materials.
- e. Nature of electromechanical vibrations in BaTiO_2 ceramics.
- f. Synthesis of metallo-organic aliphatic compounds using the diazo method - synthesis of compounds of elements of the III group - thallium and boron organic compounds.
- g. Complex resistance in the radiation by an antenna system in the presence of its electrodynamic interaction with another antenna system.

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Publications or articles emanating from the Institute of Automatics and Telemechanics of the USSR Academy of Sciences should be thoroughly investigated for coverage of these and similar subjects.

3. Reference Sec. I, par. F, Tab B. The subject of "motor transport" deals with percentages of freight or passengers carried by motor in relation to rail and other means of transportation; number of vehicles (passenger cars, busses, trucks, etc.) registered; condition of equipment, etc. This information is required for NIS, Section 64C. It is recommended therefore that this item be removed from Tab B and included in Sec. I, par. D17, Tab A.

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